2000 Golden Eagle Fact Sheet, Denali National Park and Preserve

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Denali National Park and Preserve is one of the best places in the world to watch Golden Eagles (*Aquila chrysaetos*) and many other subarctic nesting raptors including Gyrfalcons (*Falco rusticolus*), Merlins (*Falco columbarius*) and Northern Harriers (*Circus cyaneus*). Eagles and other wildlife in Denali provide visitors and employees with wonderful opportunities to observe wild animals in their natural environment. The early naturalists in Denali, including Charles Sheldon, Joesph Dixon, George Wright, and Adolph Murie studied Golden Eagles. These naturalists recognized that this area contained high densities of Golden Eagles, but they underestimated just how many eagles lived and nested in Denali. Despite the high numbers of Golden Eagles living in Alaska, there were large gaps in our knowledge about Golden Eagles in northern latitudes. We started a study in Denali in 1988 to fill in some of these gaps. Our research focuses on the reproductive success of Golden Eagles as well as their food habitats, habitat requirements, survival, and migratory behavior. Through this project we provide significant contributions about the natural history and ecology of Golden Eagles living in northern latitudes of North America.

This project is currently supported by Denali National Park and Preserve; U.S. Geological Survey, Biological Resources Division, Forest and Rangeland Ecosystem Science Center; and Department of Fisheries and Wildlife, Oregon State University. The U.S. Geological Survey, Biological Resources Division, Alaska Biological Science Center, also helps out with our satellite telemetry studies. Many wildlife biologists have contributed to this project over the years; their input continues to be very beneficial to this project.

The Golden Eagle Fact Sheet is prepared annually by Carol McIntyre, principal investigator of the Denali Golden Eagle project, to provide employees with current information on the status of the species and our research. Information contained in the Golden Eagle Fact Sheet is not to be published elsewhere without consent of the principal investigator and Denali National Park and Preserve. Please address questions to Carol McIntyre, Denali National Park and Preserve, P.O. Box 9, Denali Park, Alaska, 99755; email: Carol_McIntyre@nps.gov.

What species of eagles will visitors see in Denali? Many visitors expect to see Bald Eagles (*Haliaeetus leucocephalus*) in Denali, and for good reason! There are more Bald Eagles in Alaska than in all the other 49 states combined. Bald Eagles nest in the southern and western portions of Denali. However, in the mountainous regions of Denali, especially on the north side of the Alaska Range, visitors are much more likely to see Golden Eagles. Coastal regions of southern and southwestern Alaska are the best places to find large concentrations of nesting Bald Eagles in Alaska. Bald Eagles also nest in interior Alaska, usually along rivers or near lakes.

What are the main differences in field marks of Bald and Golden Eagles? It is easy to confuse the two species of eagles, and many visitors will think that they are looking at a Bald Eagle when they are actually looking at a Golden Eagle. What causes this confusion? Golden Eagles in Denali have very blonde hackles (hackles are the feathers along the back of the head and the neck) and in bright sunshine their heads can appear almost white. However, the tails of adult Golden Eagles are dark and the tails of adult Bald Eagles are white. So, make sure that you get a good look at the bird, especially its' tail, before you make your identification. An eagle with a white head and white tail is an adult Bald Eagle. An eagle with a blonde head and dark tail is an adult Golden Eagle. Another subtle but characteristic difference between the species is the difference in head size and wing shape; Bald Eagles have larger heads and broader wings than Golden Eagles. When you look at a silhouette of both species, you'll notice that the head and tail of a Bald Eagle are similar in size but the head of a Golden Eagle is much smaller than the tail. I think that looking at the size of the head and tail is one of the best ways to distinguish between the two species, especially if you are seeing the birds are a distance.

Things aren't so easy when you try to identify each species in immature and subadult plumage. Immature or subadult Bald Eagles can be speckled, have white bellies, have white heads and dark tails, or can be all dark. A good distinguishing field mark is that white feathers on immature or subadult Golden Eagles are usually restricted to the base of the tail and the base of the flight feathers. I think that looking at the size of the head and tail is one of the best ways to distinguish between the two species, especially if you are seeing the birds are a distance. Clark and Wheeler (1987) and Dunne et al. (1988) provide an excellent review on the field identification of both species.

Do Bald and Golden Eagles have similar diets? Both species show great plasticity in their diets, but both species prefer live prey during the breeding season. In Alaska, Bald Eagles eat mainly fish, waterfowl, seabirds, and mammals of assorted sizes. There is great individual variation in the diets of Bald Eagles as well. For instance, on the Rat Islands in the Aleutian Island Chain, Bald Eagles prey heavily on sea otter pups. The diet of Golden Eagles consists mainly of small and medium-sized mammals and birds, and they rarely eat fish. Golden Eagles prey heavily on hares, rabbits and squirrels over much of their range in western North America. Golden Eagles also prey on larger animals such as caribou calves and Dall's sheep lambs. During the nonbreeding season both species eat carrion as well as live prey.

What characteristics are unique to Golden Eagles? The Golden Eagle is a member of the genus *Aquila* in the family *Accipitridae*. (The *Accipitridae* family is one of the largest avian families with over 223 species.) *Aquila* is a distinct genus of large eagles with a cosmopolitan distribution. Six subspecies of Golden Eagles are currently recognized across the extensive global range of the species, which includes all continents except South America and Antarctica. The North American subspecies of the Golden Eagle *Aquila chrysaetos canadensis* is the only member of the genus in the Nearctic (North America). Golden eagles are widely distributed from northern Alaska across most of mainland Canada, throughout the western United States and into Mexico. In the contiguous United States, the main breeding areas of Golden Eagles are west of the Great Plains. Very few pairs of Golden Eagles breed in the eastern United States but the population of Golden Eagles in northeastern Canada is slowing increasing.

The Golden Eagle has a wingspan of more than 2 meters. Golden Eagles are most often seen in flight and they often soar on thermals, spending long periods in the air without any apparent movement of their wings. Viewed head-on in soaring flight, a Golden Eagle holds its wings in a shallow V. The adult plumage of Golden Eagles is a predominantly uniform dark brown. The feathers on the upperside of the wings are generally paler. The feathers on the head and neck range in color from deep gold to pale blonde. The adult tail-feathers have a broad, blackish terminal band. Adult plumage is attained after five or more years. The immature plumage is brown, the basal two-thirds or more of the tail is white. Most juveniles also have conspicuous white patches at the base of the flight feathers. The legs of Golden Eagles are feathered to their feet.

Female Golden Eagles are considerably larger than males. The female wing-length is nearly 10% longer than the male wing-length. Females can be as much as

40 to 50% heavier than males. Male eagles weigh about 3500 grams (about 8 lbs.) and females nearer 5000 grams (about 11 lbs.).

Golden Eagles inhabit mountainous areas over most of their range. They usually hunt in open landscapes dominated by short vegetation with restricted tree cover. Golden Eagles usually build their nests on cliffs but will also build nests in trees. Northern populations, above 55° N, of Golden Eagles are migratory.

Golden Eagles are "supremely aerial" and usually search for prey on the wing. With an array of hunting techniques that combine acute vision with power, speed, and a surprising degree of agility and dexterity, Golden Eagles are the pre-eminent diurnal predator of medium-size birds and mammals in open country throughout the Northern Hemisphere.

Where are good places to watch Golden Eagles in Denali? You can usually see Golden Eagles soaring in the skies over you anywhere in the mountainous regions of Denali . . . except at the higher elevations on Mt. McKinley! While I can't tell you all my favorite spots for watching eagles, there's a good chance to get great view of eagles near Polychrome, Igloo Canyon, or Savage River canyon.

Can I watch Golden Eagles and other raptors at their nests? Golden Eagles and other raptors are very sensitive to disturbance during the nesting period. By approaching a nest, you could cause adults to leave the area and eventually abandon their young. You could also cause young to fledge prematurely and injure themselves. Because of the potential of abandonment and disturbance, do not approach any raptor nest during the nesting season! A good rule of thumb is to stay at least 300 meters from any raptor nests.

What do I do if I find a Golden Eagle or other raptor nest? We are always interested in reports of Golden Eagles, other raptors and their nests. If you find a nest, please note its location and any activity you see at the nest and pass on the information to me. <u>However,</u> do not approach the nest . . . remember, stay at least 300 meters away from raptor nests!

If Golden Eagles and other raptors are so sensitive to disturbance, why do some nest so close to the Denali Park Road? Good question! There are a few raptor nest sites very close to the Denali Park Road. These raptors provide visitors and employees with unique viewing opportunities of a raptor's home life at close range. Most raptors in Denali lay their eggs long before the summer visitors arrive. The most sensitive period for nesting raptors is incubation; this is the time

when raptors are most likely to abandon their nests because of human disturbance. By the time Denali Park visitors arrive, many raptors along the Denali Park Road have small chicks and have invested lots of time into their nesting efforts. At this point in time, raptors probably won't abandon their nesting efforts unless they are seriously threatened. The temporary wildlife closures at these nest sites ensure that no one approaches the nest, thus keeping direct human contact to a minimum. The thousands of folks that pass these sites in buses and other vehicles do not pose a threat to the nesting raptors. The buses and other vehicles act as "blinds" -- where human activity is contained in a non-threatening situation for the raptors. Additionally, these sites have been used successfully in the past and raptors are likely to return to a nest where they have successfully raised young. As long as the raptors nesting along the Denali Park Road are not threatened, they should continue to use these sites.

Why do we study Golden Eagles in Denali? The National Park Service is mandated to protect populations and habitat for all species of wildlife that live in Denali. As you can imagine it is very difficult to manage, conserve, and protect wildlife without adequate biological information. Prior to our study, the only data available on the reproductive ecology of Golden Eagles in interior Alaska were collected by Adolph Murie in the 1930s. Data on Golden Eagles in other parts of Alaska was also very limited. In 1987, we started this study to collect baseline information on the reproductive characteristics of Golden Eagles in Denali. Because we found so many breeding pairs of eagles in 1987 (more than recorded in other parts of the Alaska Range), we proposed a larger study to continue to collect data on reproductive characteristics and examine other aspects of eagle ecology in Denali.

What makes the Denali Golden Eagle study unique? Currently, our study is the only long-term study (> 10 years) of Golden Eagle ecology in the northern latitudes of North America. Golden Eagles that nest in Denali are migratory. These Golden Eagles only spend from mid-March to late September in Denali. In late-September nearly all the Golden Eagles leave Denali and migrate south. While Golden Eagles have been intensively studied in temperate latitudes, few studies have examined the ecology of migratory birds at high latitudes. Because of our long-term data set on a large number of territorial pairs (> 60 pairs annually), we have a unique opportunity to study the ecology of migratory Golden Eagles in North America.

Additionally, our work with reproductive success can be thought of as natural experiment. Many scientific studies are based on experiments that

examine how organisms react to changes in environmental factors. Many times these environmental factors are manipulated purposefully in order to observe how organisms react to these changes. Because the main food sources for Golden Eagles in spring (hares and ptarmigan) are cyclic, our study can be viewed as a natural experiment where we measure how eagles respond to changes in their food source.

Our studies in Denali are unique due to the longevity of the data set and the large number of eagles nesting in Denali. Our examination of reproductive success at over 60 nesting areas for 13 years is unique in northern North America. We can collect long-term data on nesting area occupancy to examine stability of the population and on reproductive characteristics to examine trends in productivity very efficiently and very economically. We also have evidence that population trends of eagles in Denali are representative of a much larger area; making the Denali study area an important "index" area for examining trends in Golden Eagle productivity in interior Alaska.

How long will we be studying Golden Eagle ecology in Denali? Like many projects, the Denali Golden Eagle study has many different aspects. We are proposing to continue collecting data on nesting area occupancy and reproductive success of Golden Eagles in Denali for many years to come through Denali's Long-term Ecological Monitoring Project and are currently designing a monitoring plan that includes only 30 nesting areas. Other studies associated with Denali's Golden Eagle project are hypothesis driven and we seek funds for these projects from other sources. These projects, such as our work with telemetry, have very specific starting and ending dates.

Where are we studying Golden Eagles in Denali? Our current study area runs west from the Nenana River to Boundary and Glacier Creeks, and north from the Alaska Range to the northern slope of the Outer Range. This year we are also doing surveys for Golden Eagles and other cliff-nesting raptors on the south side of the Alaska Range.

What type of data do we collect on Golden Eagles in Denali? How do we collect these data? Currently, we are examining several aspects of Golden Eagle ecology in Denali. First, we collect data on the occupancy of nesting areas and the reproductive success of Golden Eagles annually. These data help us assess the health of the Golden Eagle population in Denali and identify factors that influence reproduction. We collect data on occupancy of nesting areas and reproductive

success using 2 standardized aerial surveys each year. In most years we conduct additional surveys by foot throughout the nesting season and sometimes by dogsled in March. We conduct the first aerial survey in late April or early May and visit all known nesting areas to determine their occupancy status and document egg laying. We also search for previously unknown or new nesting areas during this survey. We conduct the second aerial survey in late July to document nesting success and fledgling production. At this time most nestlings have reached 55 days-of-age and will soon fledge from their nests. Both surveys are conducted by Carol McIntyre from a small helicopter.

Using data collected during the two annual aerial surveys we calculate the occupancy rate of nesting areas, the nesting rate of territorial birds, the success rate of nesting birds, and overall fledgling production. Table 1 contains a summary of the reproductive characteristics of Golden Eagles in Denali from 1988 to 1999.

We are in the process of building habitat models to determine the factors that influence reproductive success. These models should allow us to predict areas where Golden Eagle nesting areas are located in areas that have not been surveyed. This research required collecting data on the habitat associations of hares, ptarmigan, arctic ground squirrels, and hoary marmots by intensively sampling for these prey species in randomly selected Golden Eagle nesting areas. We are also estimating survival rates of juvenile Golden Eagles, and identifying migratory routes, wintering areas, and summer ranges of juvenile eagles from Denali. This research is being accomplished using satellite radio telemetry. This work is providing the first information on movements of juvenile Golden Eagles from northern areas.

These studies are a cooperative effort between Denali National Park and Preserve; U.S.G.S. Biological Resources Division, Forest and Rangeland Ecosystem Science Center, Corvallis, Oregon; U.S.G.S. Biological Resources Division, Alaska Biological Science Center, Anchorage, Alaska; and the Department of Fisheries and Wildlife, Oregon State University.

How many Golden Eagles nest in Denali? There are at least 65 pairs of Golden Eagles in our study area and additional 15 pairs in the Kantishna Hills. Preliminary work completed in July 2000, suggests that there are well-over 30 territorial pairs on the south side of the Alaska Range. We don't know how many eagles nest within the entire six million-acre Park and Preserve but it is probably well over 100 pairs.

When do Golden Eagles return to Denali from their wintering areas? Adult Golden Eagles arrive in Denali by late March and early April. Some birds return as

early as February and subadults generally return later than adults. In some years, some eagle may overwinter in Denali. Overwintering is probably influenced by availability of prey such as snowshoe hare and willow ptarmigan. First year immatures usually don't leave their wintering grounds until late April.

What do Golden Eagles eat in Denali? When eagles first return to Denali in late winter they probably prey heavily on ptarmigan and snowshoe hare and eat carrion if it is available. Once arctic ground squirrels and hoary marmot emerge from hibernation in April and May, eagles prey heavily on them. From late April through August an eagle's diet consists mainly of arctic ground squirrel, hoary marmot, ptarmigan, and hare. Eagles also prey on pine martin, porcupine, Dall's sheep lambs, caribou calves, red fox, beaver, muskrat, smaller mammals (voles) and a variety of birds. Murie (1944) suggested that the effect of eagle predation on Dall's sheep lambs and caribou calves is negligible.

How do Golden Eagles in Denali find their prey? Golden Eagles in Denali use three main strategies to search for prey: soaring, still hunting from a perch, and low contour flying. The escape response of the prey, weather conditions, topography, and experience of the bird usually determine the hunting strategy used by a Golden Eagle. I often see Golden Eagles using low contour flying in Denali, flying low along the mountainsides in hopes of surprising an arctic ground squirrel, hoary marmot, or ptarmigan. One of my favorite things to do is to watch Golden Eagles hunting arctic ground squirrels early in the season. The squirrels burrow up out of the snow and are very obvious as they run along the snow from hole to hole. Eagles will fly low over the snow and ambush the squirrels.

Does anything eat Golden Eagles? Our data show that predation is not much of a problem for adult Golden Eagles and we rarely document it at nests. Most nests are inaccessible to ground predators such as fox, wolverine, marten or wolves. Additionally, adult Golden Eagles would probably attack any small mammalian predator that approached their nestlings. Golden Eagles will also defend their nest from other eagles and other raptors. But, there are exceptions to every rule. In June 2000, a sow Grizzly with 2 spring cubs climbed in to an eagle nest located near Polychrome and devoured the small eaglets that were in the nest. This nest was located on a ledge that was easily accessible to all ground predators. Whether the bear was attracted to the eaglets or to the cache of ground squirrels in the nest in open for speculation.

Where do Golden Eagles build their nests in Denali? Most eagles in Denali build their nests on cliffs or rock outcroppings, although we have found several nests in trees along the Nenana River north of Denali. The nests can be very large (>5' tall and 5' wide) or surprisingly small (just large enough to hold an incubating eagle). Nests are constructed from sticks and are lined with grasses, lichen and feathers.

Are there other cliff-nesting raptors in Denali? We really have it good in Denali. In addition to having a large population of Golden Eagles we also have a relatively large population of Gyrfalcons. Gyrfalcons are the largest falcons in the world and inhabit circumpolar arctic and subarctic regions. There are also several pairs of Peregrine Falcon (*Falco peregrinus*) nesting in Denali. It is more likely that any large falcon you see in Denali is a Gyrfalcon . . . although keep your eyes out for Peregrines too! (Because of their size and shape, visitors often misidentify Gyrfalcons as Peregrines. How can you tell them apart? Gyrfalcons are larger and blockier and their wings are longer and wider than a Peregrine. Peregrines look sleek compared to Gyrfalcons. The plumage on a Peregrines head resembles a black helmet. Refer to Dunne et al. (1988) or Clark and Wheeler (1987) for more details about telling the species apart.)

Gyrfalcons nest in similar habitat as Golden Eagles and often use nests originally built and used by Golden Eagles for their own nesting efforts. Gyrfalcons in Denali are probably resident, although juveniles disperse away from their natal areas in fall. Gyrfalcons that winter outside of the species breeding range are usually immatures and subadults. Adults may also leave the breeding range when food supplies are very low. Gyrfalcon diets consist mainly of birds; the three species of ptarmigan found in Denali (Rock, White-tailed and Willow) are important year round food sources for Gyrfalcons in Denali. Arctic ground squirrels are important food sources for Gyrfalcons during the nesting period.

One of my favorite wildlife experiences in Denali is watching Golden Eagles and Gyrfalcons duke it out in aerial "dog fights". Watching two large raptors scream through the sky at each other is a sight to see!

When do Golden Eagles lay eggs in Denali? How many eggs do they lay? How many pairs lay eggs each year? Most pairs of eagles complete their clutches by early to mid-April. Clutches are made up of one to three eggs. The number of pairs that lay eggs in Denali varies annually (Table 1) and we have strong evidence to suggest that egg laying is influenced by population cycles of snowshoe hare and willow ptarmigan. More eagles lay eggs when populations of snowshoe hare and

willow ptarmigan are high and fewer eagles lay eggs when these prey populations are low.

When do eggs hatch? Eggs hatch 45 days after egg laying. Hatching takes place from mid-May through early June in Denali.

When does fledging occur? How many fledglings are produced each year? Eaglets take their first flight about 70 days after they hatch. Most eaglets in Denali fledge by early August. The number of fledglings produced each year has ranged from a low of nine in 1994 to a high of 71 in 1999 (Table 1). Years when snowshoe hare and willow ptarmigan are at the high point of their cycles usually are good for eagle reproduction as well.

When do fledglings leave their nesting areas and begin their first autumn migration? Eagles usually leave their natal nesting areas in late September and immediately embark on their first migratory journey.

Do fledglings follow their parents south? Do families or siblings travel together? There is no evidence that families travel together or that fledglings follow their parents south. Our ongoing work with satellite telemetry suggests that fledglings leave Denali independent of their parents and that they travel alone.

Where do Golden Eagles from Denali spend their winters? Very few Golden Eagles overwinter in interior and northern Alaska. Data from our banding and satellite telemetry studies show that Golden Eagles from Denali winter as far east as Kansas and South Dakota, as far south as northern Mexico, and as far west as central Washington. Adults and subadults may winter in different geographic areas. The northern extent of their wintering areas is unknown. Winter sightings of Golden Eagles in Denali are uncommon. However, Grant Pearson referred to them as winter residents. A few Golden Eagles are seen in interior and northern Alaska each winter and more Golden Eagles overwinter in Alaska in years when snowshoe hare and ptarmigan populations are at the high point of their population cycles. For instance, we recorded a hare high in 1999 and we frequently saw Golden Eagles in the Alaska Range during the winter of 1999-2000.

How long does it take a Golden Eagle to travel from Denali to its wintering range? The migratory journey of an immature Golden Eagle during fall migration

ranges from four to nine weeks. Most immature Golden Eagles from Denali complete their first migratory journey south in about six weeks.

Where do subadults spend their summer? Subadults are seen in Denali in summer, but not in great numbers. Subadult eagles wandering into Denali have to deal with the territorial eagles that inhabit nesting areas. This means exposure to many aggressive interactions that could possibly mean death to the younger, inexperienced eagles. In 1998, many first year Golden Eagles from Denali that carried radio transmitters spent their summer on the North Slope of Alaska. In 2000, our radio-tagged eagles were spread across northern and interior Alaska.

What do your preliminary results with satellite telemetry tell us about Denali's eagles? We are using satellite radio telemetry to explore the life histories of Golden Eagles that originate in Denali. It is becoming increasingly clear that conservation of migratory birds that are raised or breed in Alaska, including raptors, must include consideration of both wintering and breeding areas and migratory stopover points. Satellite radio telemetry allows us to monitor the long-term movements of Golden Eagles across North America, information that could never be garnered in any other way.

Until recently, banding and color-marking were the only ways to study bird migration. In most cases, large numbers of banded or marked birds were required to gain a small amount of information. For instance, as of May 2000 we re-encountered less than 4% of the 300 Golden Eagles that we banded in Denali from 1987 to 1997. The use of conventional telemetry transmitters has several advantages over banding and color-marking, but we would need a small fleet of planes to track Denali's Golden Eagles from Alaska to their wintering grounds. A few years ago, technology gave birth to satellite radio telemetry, a great tool for studying animal movements. The first satellite transmitters weighed nearly 11 kg and were used to track elk. Recent advances in satellite-based telemetry have resulted in radio transmitters that are small and lightweight enough (about 20 grams) to be carried by birds as small as Peregrine Falcons.

Since 1997, we've used 90-gram satellite radios to study the annual movements of Golden Eagles raised in Denali. Results from our recent studies are very promising. Where banding revealed a single point along a migratory route or a wintering area, satellite telemetry shows us entire migration path and winter and summer ranges of Denali's Golden Eagles and allows us to examine annual movements in relation to environmental correlates such as habitat and weather. Data from 1997 has already provided us with a complete "round-trip" of data. In

1997 and 1998 we successfully tracked five juvenile Golden Eagles from Denali to their wintering areas and back to Alaska the following summer. These juvenile eagles traveled over 4000 miles during their first year from Denali to wintering grounds in Wyoming, Montana, Colorado, and southern British Columbia and to summer grounds on Alaska's North Slope. Autumn migration commenced in late September 1997 and young birds reached their respective wintering areas in less than a month. Birds remained on their wintering area until late April and early May and were back in Alaskan airspace by early June. In 1999 we tracked a complete round trip for 7 juvenile Golden Eagles that we radio-tagged in 1999. These juveniles traveled great distances during their first year, and expanded our knowledge of the wintering ranges including movements into South Dakota, central Washington, and southeastern New Mexico. During summer, these eagles were scattered across interior and northern Alaska and northern Yukon.

Not all of the radio-tagged eagles lived through their first year. We retrieved many of the radio-tagged eagles that died and sent their carcasses to a wildlife lab in Alberta for necropsy. Necropsy examinations indicate that most eagles died from starvation, but one was electrocuted and another illegally shot. Using data from our three year study on juveniles we'll be able to calculate an estimated survival rate for Denali's juvenile eagles. We predicted that survival rates of juvenile Golden Eagles would be much lower than that of nonmigratory eagles. This estimate will be useful for modeling the population trends and population trend projections of Denali's eagles.

How long do Golden Eagles live? As birds go, Golden Eagles live a long time. The oldest Golden Eagles recorded in the wild were 26 and 32 years old. (These data are from encounters of birds banded in France and Sweden.) While these longevity records are interesting, they don't tell us much about the <u>average</u> life span of Golden Eagles because mortality is very high in young birds. Generally, larger raptors live longer than smaller ones. Mortality rates of juvenile Golden Eagles are unknown but estimates of mortality for migratory Golden Eagles range from 75 to 90%. This means that potentially only 10 to 15% of the eaglets that leave nests in Denali will live to reach sexual maturity at about five years of age. With this in mind, you can see that the average life span of a Golden Eagle can be quite short. However, if an eagle survives through its first few years, it may live to at least 25 years of age.

What are the major causes of mortality? Reports of death because of "natural causes" in wild Golden Eagles are few. Most naturally occurring deaths are

undetected because corpses quickly disappear in the wild and the probability of finding a dead Golden Eagle in remote areas of Alaska, western Canada, and the western United States is very low. Starvation, disease, and death caused by predators (including other eagles) are probably the most common natural causes of death. Preliminary results of our telemetry studies suggest that starvation is very common in first year eagles after they leave their nesting areas. Unfortunately we also have recorded mortalities of Denali's eagles due to illegal shooting and electrocution.

Unfortunately, direct and indirect persecution by humans continues despite tremendous efforts to educate the public on the value of predators and protection by the Bald Eagle Act and the Migratory Bird Treaty. While direct human persecution is probably less common than it was 20 years ago, it remains a threat to Golden Eagles.

A much more serious threat to Golden Eagles from Alaska is the degradation of native landscapes in the western United States. Wintering grounds of Denali's eagles including most of the western United States, Great Plains region, and northern Mexico are undergoing habitat alteration and destruction at an alarmingly rapid rate. Invasions of exotic plans, such as cheatgrass, in the Great Basin area are changing the fire regime of the area and in turn are affecting the abundance of prey. These changes are likely to have detrimental effects on Golden Eagle populations nesting and wintering in the western United States.

Are Golden Eagles from Denali threatened or endangered? Golden Eagles are not listed as threatened or endangered in Alaska. Fortunately, the Golden Eagle population in Denali appears to be stable. However, Golden Eagles from Denali are exposed to a variety of hazards during migration and winter. Overall, alteration and destruction of native habitats is probably the greatest threat to Golden Eagles throughout their range. Unfortunately, mortality caused by illegal shooting and poisoning continues to be a problem in areas where Denali's Golden Eagles spend their winters. For example, an eagle banded in Denali in 1993 was shot and killed illegally the following winter in Russell County, Kansas. Lead poisoning also continues to be a problem.

What are we doing this year? We are continuing to collect data on nesting area occupancy and reproductive characteristics of Denali's Golden Eagles and Gyrfalcons in 2000. This work is being funded by Denali's Long-term Ecological Monitoring Program. We are also continuing our science education work in the TriValley School in Healy.

Interested in learning more about Golden Eagles in Denali? Anyone working in Denali will enjoy reading the accounts of Charles Sheldon (1930), Joesph Dixon (1938), and Adolf Murie (1944, 1963). Not only will you learn more about the natural history of Golden Eagles, you will also learn more about the natural history of this area. Check out McIntyre and Adams (1999) for detailed information on Golden Eagle reproductive success in Denali. Pick up a copy of "The Golden Eagle" by Jeff Watson (1997) for more detailed information on the species throughout its range. Refer to Dunne et al. (1988) and Clark and Wheeler (1987) for help with field identification. Complete titles of these and other books cited in this fact sheet are listed below.

How can you help with this research? You are an important resource in Denali because you provide visitors with information about our research, educate our visitors about the importance of Golden Eagles and other birds in subarctic ecosystems, promote public support for research on lands administered by the National Park Service, and provide us with additional information on Golden Eagles and other raptors that you see during your Denali adventures. All your efforts promote research and conservation in National Parks!

Need more information? Please contact Carol McIntyre at Denali National Park and Preserve if you have any questions about Golden Eagles or other raptors in Denali.

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